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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/728,108

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EXAMINER

BARTON, JEFFREY THOMAS

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/728,108	Applicant(s) CHOU ET AL.	
	Examiner Jeffrey T. Barton	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 September 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 and 17-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 and 17-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. The amendment filed on 12 September 2008 does not place the application in condition for allowance.

Status of Rejections Pending Since the Office Action of 20 June 2008

2. All rejections are maintained.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claim 13 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. There is no disclosure of a generator wherein "the emitter is positioned remote from the second section" in the specification as originally filed.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 13, 14 and 18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 13, it is not clear how distant from the second section the emitter must be to be considered "remote from the second section". Figure 1, cited for support of this limitation appears to show emitter 4 being proximate, and indeed connected to what appears to be the second section, in contrast to the language of claim 13.

Claim 14 requires the internal chamber to comprise first and second tubular sections, with "the expansion step [being] formed from the second tubular section to the first tubular section". This is indefinite because the expansion step was already limited to "transitioning from the second section to the first section", with the first section forming the internal chamber, in claim 1. It is not clear where within the variously recited structure the expansion step is desired to be located. It appears that claim 14 is essentially redundant, with the "tubular sections" of claim 14 corresponding to the "sections" of claim 1.

Claim 18 currently reads "The micro TPV generator emitter is formed as part of the combustor.", which is indefinite because there is no clear antecedent basis for "The micro TPV generator" or "the combustor". The claim is considered to be limited to a micro TPV generator in which the emitter is formed as part of the combustor.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1, 13, 14, and 18 are rejected under 35 U.S.C. 102(e) as being anticipated by Kovacik et al. (US 2006/0107995)

Kovacik discloses a thermophotovoltaic generator as shown in figure 3.

Regarding claims 1 and 18, figure 3 shows the generator comprising an inlet (i.e. at top end of burner body 24 as illustrated in Figure 3) and combustor downstream from the inlet (Burner body 24 and internal SiC tube 26), wherein the combustor comprises first (26) and second (Directly above 26 in Figure 3) sections as claimed, wherein a cross-sectional width of the first section is greater than a cross sectional width of the second section (Figure 3); the first section 26 forms an internal chamber having an outer wall, and an internal expansion step comprises transitioning from the second section to the first section; an emitter 28 formed around the outer wall of tube 26 as claimed, and formed as a part of the combustor (Figure 3; emitter is integral to the assembly); and a photovoltaic cell 14 in proximity to the emitter, configured to generate an electric current.

Note that the limitation "combustion of the fuel occurs at the first section" recited in claim 1 is not to be given undue weight, as it is directed to the intended use of the claimed generator. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). In the instant case, there is no apparent structural difference between the prior art and the instant structure, and no reason to believe that the structure of the prior art is not capable of performing the intended use.

Regarding claims 13 and 14, emitter 28 is remote from the second section in that there is distance separating them and the emitter 28 is present at positions remote from the second section, e.g. below tube 26 as illustrated in Figure 3. The internal chamber present in the device can be construed as comprising first (26) and second (Directly above 26 in Figure 3) tubular sections, wherein the first section 26 has a cross-sectional width and diameter greater than those of the second section.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claims 2-5, 7-12 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kovacik in view of Gardner et al. (U.S. 6,786,716).

The disclosure of Kovacik is as stated above in addressing claim 1.

Regarding claims 3 and 4, figure 3 of Kovacik shows a cylindrical outer wall for the combustion chamber and a backwards facing step immediately above section 26.

Regarding claims 5 and 7, Kovacik discloses that the emitter is matched to the characteristics of the solar cell (paragraphs 0027-0030), discloses use of SiC as a possible emitter. (paragraph 0027)

Regarding claim 8, Kovacik discloses the use of a filter, 16, between the emitter and the solar cell (paragraph 0031).

Regarding claim 9, Kovacik discloses the use of glass and dielectric filters, including multiple layers of dielectric materials (paragraphs 0033 and 0035).

Regarding claim 10, Kovacik discloses GaSb photovoltaic cells (paragraph 0029).

Regarding claims 11 and 12, Kovacik discloses burner design dependent on the type of fuel utilized.

Regarding claim 17, Kovacik discloses SiC being used to form portions of the combustor. (Paragraphs 0013 and 0027)

The differences between Kovacik and the claims include the use of a platinum catalyst and the size of the device.

Gardner teaches a microcombustor as shown in figure 1 that utilizes platinum catalyst on the inside walls of the combustion chamber (column 7, lines 49-51). Gardner also teaches the microcombustor can have sizes less than a millimeter (column 5, paragraph 1).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the combustion size and platinum catalyst of Gardner within the combustion chamber of Kovacik because the microcombustor allows for lean burning at low flames and at temperatures less severe than with diffusion flames, thus enabling a longer system lifetime, reduced fuel consumption, and portable applications (Gardner column 3, paragraph 2) and the catalyst enables flame stabilization in the

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microsystem, permits combustion with lean fuel/air mixtures, lowers the combustion temperature and extends materials limits of flammability (Gardner column 3, paragraph 2). Because Gardner and Kovacik are both concerned with combustion systems, one would have a reasonable expectation of success from the combination.

Regarding claim 9, as Kovacik disclosed, the choice of layers within the filter depends on the specific filter performance required for a specific application. In the absence of evidence of criticality, it would have been further obvious to choose a specific number of layers as within the claim and to use the specific materials of the claim as SiO_2 is a known dielectric and both Si and SiO_2 are within the glass disclosed by Kovacik.

Regarding claims 11 and 12, the choice of fuel and operating pressures are dependent on the specific application and would be obvious to one skilled in the art to make such choices. Further the small diameters of the claims are taught by Gardner for microcombustion systems and would be obvious to choose such diameters for the reasoning given above pertaining to microcombustion advantages.

13. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kovacik et al and Gardner et al as applied to claims 2-5, 7-12, and 17 above, and further in view of either Applicant's admitted prior art or Ferguson et al. (Materials Science and Engineering reference)

Kovacik et al in view of Gardner et al is relied upon for the reasons given above in addressing claims 2-5, 7-12, and 17. In addition, Kovacik et al suggests using

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magnesium oxide emitters doped with d-series transition elements. (Paragraph 0029; cobalt and nickel are d-series transition elements)

Neither Kovacik et al nor Gardner et al teach an emitter formed of Co-/Ni-doped MgO ribbon or tape.

Applicant's specification teaches that it is known in the art that doping cobalt oxide or nickel oxide into MgO can produce matched emitters with continuous strong radiant emissions in the optimal energy range and minimal energy at nonconvertible wavelengths. (Page 7, lines 5-8)

Ferguson et al teaches that emitters matched to GaSb photovoltaic cells (disclosed by Kovacik et al at paragraph 0029) can be prepared by doping magnesium oxide with cobalt or nickel. (Abstract; Paragraph bridging pages 36 and 37) The emitters of Ferguson et al are tape cast. (Paragraph bridging pages 36 and 37)

It would have been obvious to one having ordinary skill in the art to further modify the system of Kovacik et al by specifically choosing Co-/Ni- doped magnesium oxide tape emitters, as taught by Applicant's admitted prior art or Ferguson et al, because Applicant teaches that it is known in the prior art that effective matched emitters are obtained by doping Ni or Co into magnesium oxide, or because Ferguson et al teaches the excellent emitter match to the GaSb cells disclosed by Kovacik et al. In addition, Kovacik et al suggest using d-series transition element-doped magnesium oxide as the emitter, further suggesting the obviousness of such an emitter selection.

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14. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kovacik et al and Gardner et al as applied to claims 2-12 and 17 above, and further in view of DePoy et al. (US 6,043,426)

Kovacik et al and Gardner et al teach a generator as described above in addressing claims 2-12 and 17.

Neither Kovacik et al nor Gardner et al teaches a system comprising InGaSb or InGaAsSb thermophotovoltaic cells.

DePoy et al teach a TPV system using heavily doped InGaSb or InGaAsSb cells (Column 2, lines 19-23; Column 5, lines 8-14)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Kovacik et al and Gardner et al by replacing the cells with heavily doped InGaSb or InGaAsSb cells, as taught by DePoy et al, because DePoy et al teaches that these cells provide improved efficiency and open-circuit voltage, among other advantages. (Abstract, Column 5, lines 8-14)

15. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kovacik et al in view of Fraas et al. (US 6,489,553)

Kovacik et al is relied upon for the reasons given above in addressing claims 1, 13, 14, and 18.

Kovacik et al do not explicitly teach a hexagonal cell arrangement around the emitter.

Fraas et al teaches a thermophotovoltaic generator in which a polygonal array of thermophotovoltaic cells surrounds the emitter for absorption of the emitted radiation. (Abstract; Figure 2 shows an octagonal embodiment)

It would have been obvious to one having ordinary skill in the art to modify the system of Kovacik et al by specifically mounting the thermophotovoltaic cells in a polygonal array around the emitter, as taught by Fraas et al, because Fraas et al teach the effectiveness of this arrangement in absorbing the radiation emitted from a cylindrical emitter similar to that of Kovacik et al. (Compare Fraas et al Figures 2 and 3 with Kovacik et al Figures 2 and 3) Selection of a particular polygonal cross section (i.e. square, hexagonal, octagonal, etc.) would be a matter of design choice to one having ordinary skill in the art, dependent on the dimensions of the emitter and available cells, as well as the desired spacing of the cells from the emitter.

Response to Arguments

16. Applicant's arguments filed 12 September 2008 have been fully considered but they are not persuasive.

Applicant points to Figure 1 as support for the new limitation of claim 13, requiring the emitter to be "positioned remote from the second section". As described in the rejections under 35 U.S.C. §112, first and second paragraphs above, the new limitation is considered to be new matter, and indefinite based on the disclosure of Applicant's figure 1, which shows the emitter connected to the second section.

Applicant further argues that "[c]learly combustion of the fuel of in Kovacik occurs immediately upon entry into the device at burner 24." Applicant has provided no evidence to support this assertion, nor has Applicant has provided evidence to indicate that the structure of Kovacik et al is incapable of performing the intended use. Indeed, there is no evident structural difference between the prior art structure and that claimed. Tube 26 is recited as being a part of the burner structure: "A burner 24 with internal SiC tube 26 . . ." (Paragraph 0013). This structure provides a pathway along which combustion will occur, apparently as in Applicant's structure. Bare assertions of difference in operation are not sufficient evidence to overcome the rejection. In addition, as noted above, the limitation to combustion occurring at the first section is directed to the intended use of the device, and is therefore not to be given undue weight.

Applicant's arguments to the advantages provided by the expansion step are not persuasive because all structural limitations of claim 1 are present in Kovacik et al.

Conclusion

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within

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TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Jeffrey T. Barton whose telephone number is (571)272-1307. The examiner can normally be reached on M-F 9:00AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nam X Nguyen/

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Supervisory Patent Examiner, Art Unit 1753

JTB

3 December 2008